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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/561,088

05/05/2006

Dieter Grafl

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68459 7590 05/05/2009  
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EXAMINER

MEKHLIN, ELI S

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/561,088	<b>Applicant(s)</b> GRAFL ET AL.	
	<b>Examiner</b> ELI MEKHLIN	<b>Art Unit</b> 4191	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2005.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 22-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-44 is/are rejected.
- 7) ☒ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/7/2009 and 5/5/2006</u> .                                   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. This is the first office action on the merits.
2. The Preliminary Amendment filed May 8, 2006, has been entered. Applicant cancelled claims 1-21 and added claims 22-44, which are currently pending before the Office for examination.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 22-23, 26-27, 30, 32-33, 35, 37, and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by TAKAHASHI et al. (JP 10241707 A). Please note that all citations to this reference will refer to the included machine translation.
3. With respect to claim 22, TAKAHASHI teaches a fuel cell that has a separator plate that comprises, among other things, a corrugated panel (distribution portion for distributing a medium) for current collection which consists of a collecting section and form reactant gas channels (distribution structure). Figure 1, Paragraph 9. TAKAHASHI further teaches that the corrugated plate is elastically deformable. Paragraph 11. Specifically, the corrugated panel elastically deforms when it is clamped against another plate, meaning the distribution structure of the corrugated panel is elastic in at least one plane between a loaded condition and an unloaded condition. Paragraph 11.

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4. With respect to claim 23, TAKAHASHI teaches that the reactant gas channels (distribution structure) are disposed between two plates on a spatially structured layer.

Figure 1, Paragraph 9.

5. With respect to claim 26, TAKAHASHI teaches that the plates are secured together via clamping. Paragraph 8.

6. With respect to claim 27, TAKAHASHI teaches that electrode plate (first plate) and a separator plate (second plate) are in sealing communication with one another (wet seal part) and the distribution structure, i.e. the corrugated panel is disposed between the two plates. Paragraph 14, Figure 2.

7. With respect to claim 30, TAKAHASHI teaches that the distribution structure, i.e. the corrugated panel and the reactant gas channels that it forms, is a generally parabolic cross-section in the unloaded condition. Figure 1.

8. With respect to claim 32, TAKAHASHI teaches that the corrugated panel (distribution structure) is deformed in the loaded condition. Paragraph 11.

9. With respect to claim 33, TAKAHASHI does not expressly state that the sidewalls of the reactant gas channels are deformed in the loaded condition; however, this is an inherent feature. It is inherent because applying enough pressure to the top of an elastically deformable to deform the structure would necessarily, even to a small degree, deform the side walls of that same elastically deformable structure.

10. With respect to claim 37, TAKAHASHI teaches that the corrugated panel (distribution structure) teaches a plurality of partially different elastic portions, which are the reactant gas channels. Figure 1, Paragraph 11.

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11. With respect to claim 39, TAKAHASHI teaches that the corrugated panel is a media tight plate. Paragraph 14.

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

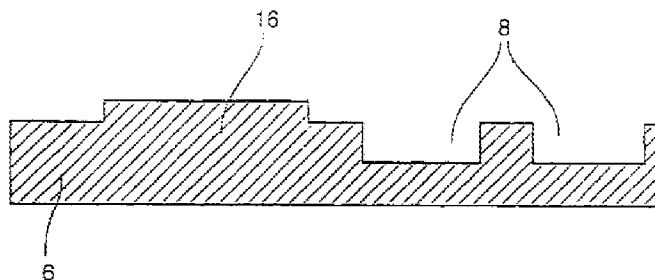
14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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15. Claims 22-24, 27, 29-35 and 37-42 rejected under 35 U.S.C. 103(a) as being unpatentable over ELIAS (U.S. Patent No. 5,928,807) in view of REN et al. (WO 01/48852).

16. With respect to claim 22, ELIAS teaches a fuel cell that has a separator plate that has flow channels (distribution structure) in the plate for distributing a medium. Figure 3 (below), Col. 2, Lines 26-33. ELIAS teaches that the entire distribution plate is made out of an elastic, plastically deformable material. Col. 1, Lines 44-48. Specifically, ELIAS teaches that the entire plate is elastic and made from the same material to account for thermal expansion, i.e., during fuel cell operation the plates heat and expand, such that making the plates elastic allows the plates to elastically deform, while loaded, to prevent leaks. Col. 1, Lines 28-35. ELIAS does not require that the distribution structure be disposed within the distribution portion—rather, ELIAS requires that the distribution structure of the distribution portion and the separator plate be integrally formed. Col. 2, Lines 26-33.

Fig. 3



17. However, REN, which deals with flow channels for electrochemical cells, teaches that separately forming the flow distribution assembly, in the form of a sheet, and then pressing the distribution assembly against a backing plate to create a bipolar plate provides a compact and inexpensive method for forming a bipolar plate. Page 2, Lines 20-23. Additionally, as per the MPEP, making an integral item separable is obvious. 2144.04(V)(C). Specifically, a person having skill in the art would appreciate that making the elastic distribution structure separate from the actual plate itself would not change the overall function of the two structures when combined. Additionally, although ELIAS teaches that the elastomer seal should not be made separate from the plate, ELIAS does not discuss any detriment to making the distribution structure and plate separate. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to make the distribution structure separate from the distribution plate because REN teaches that doing so provides for a more cost-effective production system for distribution plates with distribution structures.

18. With respect to claim 23, ELIAS teaches that the distribution structure is disposed between the separator plate and the electrode plate in the membrane electrode arrangement. Figure 1. This is a spatially structured layer. Figure 1, Col. 2, Lines 28-33.

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19. With respect to claim 24, ELIAS teaches that the channels (distribution structure) on the plate are formed by stamping, which a person having skill in the art would appreciate is a form of surface pressing. Col. 3, Line 45-46. Specifically, a person having skill in the art would appreciate that stamping is a form of surface pressing because a stamp is used to shape, i.e., press, the material of the separator plate into a given structure.

20. With respect to claim 27, ELIAS teaches that the distribution structure is disposed between the distribution plate and the electrode membrane plate (Figure 1) and that the plates are in sealing communication with one another. Col. 3, Lines 25-26.

21. With respect to claim 28, ELIAS teaches that the channels/ducts (distribution channel) are configured to allow gases (media) to serially flow through them. Col. 2, Lines 35-37, 44-48, 52-61. The ducts/channels are connected to an entry and exit. Col. 2, Lines 52-61.

22. With respect to claims 29-31, ELIAS teaches that the distribution structure (channel) is used to provide for gas flow and that the structure is deformable to ensure a complete media seal during thermo-induced expansion and deformation. Col. 1, Lines 44-47, Col. 2, Lines 26-33. Therefore, it would have been obvious to a person having skill in the art at the time of invention to modify the shape of the elastically deformable structure because modifying the shape would impact the type of seal that is formed during thermo-induced expansion and deformation. Specifically, the size of the elastically deformable distribution structure would impact the surface area of the seal that is created. Additionally, as per the MPEP 2144.04(IV)(B), changes in shape are a



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“matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed [shape] was significant.”

23. With respect to claims 32-33, ELIAS teaches that the distribution plate is made from elastic material so that if the distribution plate thermally expands during heating, the distribution structure disposed on the plate will deform to prevent the seal from breaking. Col. 1, Lines 28-47. A person having skill in the art would appreciate that when the distribution structure thermally expands in the loaded condition, the distribution structure will elastically deform in response. Additionally, a person having skill in the art would further appreciate that when a three-dimensional structure elastically deforms, the deformation of one side has an impact on whether the other sides of the structure deform. Specifically, a person having skill in the art would appreciate that when the top of an object deforms, the change in shape of the top impacts the shape of the sides of the distribution structure.

24. With respect to claim 34, ELIAS teaches that the distribution structure (channels/ducts) is projections that extend outwardly from the distribution portion.

Figure 3.

25. With respect to claim 35, ELIAS teaches that the distribution structure includes a channel. Figure 8, Col. 2, Lines 35-37, 44-48.

26. With respect to claim 37, ELIAS teaches that the bipolar plate contains multiple elastic flow channels and an elastic seal integrated into the plate, which are partially different elastic portions in the distribution structure.

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27. With respect to claim 38, ELIAS teaches that the plate, and thus the distribution structure, is formed from graphite. Col. 4, Lines 15-20.

28. With respect to claim 39, ELIAS teaches that the distribution plate is media tight. Col. 3, Lines 25-26.

29. With respect to claim 40, Examiner notes that spring rate is a mathematical expression of the amount of weight/force needed to compress a spring. Accordingly, the greater the spring rate of an object, the more force that is needed to compress the object. Therefore, it would have been obvious to a person having skill in the art at the time of invention to vary the spring rate to manipulate how response the deformable distribution structure would be to force exerted against it.

30. With respect to claim 41, ELIAS teaches that the distribution structure (flow channels) has adjacent flow channels that are separated by the actual channel creating structure, which would create a first space proximate a second space, said first and second portion sharing a wall. Figure 3.

31. With respect to claim 42, ELIAS also teaches that the distribution structure (flow channels) has a serpentine configuration, such that adjacent flow channels (first and second openings) would be expected to open in opposite directions. Figures 2 and 3.

32. With respect to claim 43, ELIAS teaches that the distribution plate is a bipolar plate.

33. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over ELIAS (U.S. Patent No. 5,928,807), as applied to claims , and in view of ONODA et al. (U.S. Patent No. 4,997,728)

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34. ELIAS teaches that the fuel cell plate is combined with over components to create a media tight seal, but is silent as to how this seal is obtained.

35. However, ONODA, fuel cells, teaches that fuel cells can be secured by surface pressing the fuel cell stack (plurality of plates) together. Abstract and Figure 3.

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to secure the plurality of cells via surface pressing because ONODA teaches that surface pressing effectively seals the plurality of plates (fuel cell stack).

36. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over TAKAHASHI et al. (JP 410241707 A).

37. TAKAHASHI teaches a fuel cell that has a separator plate that comprises, among other things, a corrugated panel (distribution portion for distributing a medium) for current collection which consists of a collecting section and form reactant gas channels (distribution structure). Figure 1, Paragraph 9. TAKAHASHI further teaches that when the fuel cell stack is clamped together to seal it, planar pressure becomes uneven and highly localized at the clamp position. Paragraph 6. In light of this, a person having ordinary skill in the art at the time of invention would realize that modifying the material thickness of the of the distribution structure would make uniform the planar pressure exerted by the clamping structure. Specifically, tapering the material thickness of the distribution structure that is closest the clamping pressure points would decrease the localized planar pressure, which would allow for more uniform planar pressure.

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38. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over ELIAS (U.S. Patent No. 5,928,807), as applied to claims , and in view of TURPIN et al. (WO 03/034530 A2)

39. ELIAS teaches the parameters of the fuel cell, but is silent as to whether the fuel cell is used in an electrolyser or electrochemical compressor system.

40. However, TURPIN, which deals with flow field plates, teaches that it is known in the art that fuel cells are essentially reverse electrolyzers and the structure in one is applicable to the structure in the other. Page 1, Lines 5-13. Therefore, it would have been obvious for a person having skill in the art to use the fuel cell structure taught by ELIAS in an electrolyser because TURPIN teaches that electrolyzers have the same structural features as fuel cells, the only difference being that they work in reverse.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELI MEKHLIN whose telephone number is (571)270-7597. The examiner can normally be reached on 5/4/9.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on 571-272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ELI MEKHLIN/  
Examiner, Art Unit 4191

/J.A. LORENZO/  
Supervisory Patent Examiner, Art  
Unit 1793